It’s all uphill to Oakland; Building the B&O’s 17-mile Grade

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B&O West End

- The West End of the B&O Railroad begins at Viaduct Junction in Cumberland, and proceeds along the Potomac River Valley to Piedmont, WV.
- From there, it begins the climb up the 17-Mile Grade to Altamont, then down the Cranberry Grade to Grafton.

B&O's westward expansion timetable

- The B&O Railroad reached Cumberland from Baltimore in 1845.
- Piedmont was reached in 1851.
- Grafton was reached in 1852.
- B&O reached its goal, the Ohio River, at Wheeling, Va. 1853. Goal set by Va. Legislature.
- Rail service from Baltimore to Cincinnati and St. Louis by 1857.

Challenges

- After the B&O reached Piedmont in 1851, the easy part was over.
- Now the line had to climb 17 miles over Backbone Mountain.
- This was the B&O's "Third Division."
- It was a major challenge for men and machines. It is still a benchmark of engine hauling and braking performance.

“The gorges are very deep, really frightening to contemplate…fearful black yawning precipices…”

Google earth

miles 3
km 5

Key players

- Architect and Civil Engineer Benjamin Latrobe.
- Locomotive manufacturer Ross Winans.
- Station designer E. F. Baldwin.
- And thousands of laborers.

Benjamin Latrobe, II

- son of “the father of American Architecture”
- Chief engineer for B&O RR.
- Designed the Thomas viaduct at Relay, MD, 1833-35. Still in daily use.
- Designed the Bloomington Viaduct at the foot of the 17-mile grade. White sandstone, triple 56 foot arches, 50 feet above the river.
- His brother-in-law (Henry Hazelhurst) had built the Eckhart Railroad, for the Maryland Mining Company, with a 2.5% grade (greater than the 17-mile).

Ross Winans

- Locomotive designer and builder from Baltimore.
- Noted for his *Camel* engines.
- Engines built at Mount Clare Shops.

E. F. Baldwin

- 1837-1916; Baltimore.
- Station design for B&O Railroad and others.
- Queen Anne Style.
- Examples at Point of Rocks, Frostburg, PawPaw (WV), Laurel, Mt. Royal (Baltimore), Gaithersburg, Keyser, Oakland, and others.
- also the B&O Railroad Museum roundhouse, and the warehouse at Camden Yards.

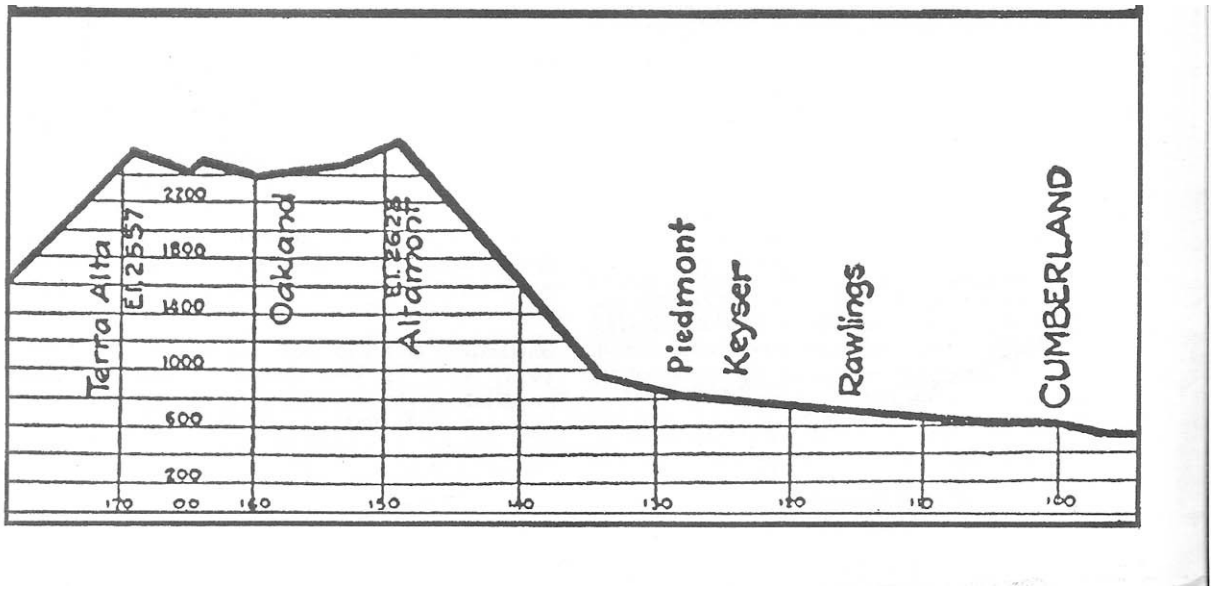
17-Mile Grade

- The 17-Mile Grade begins at the Bloomington bridge over the Potomac. This three-arch structure, referred to as Bridge 79 by the B&O, was built in 1851. From here, the 2.28% rail line snakes west up Backbone Mountain, keeping the Savage River on the right. Near the top, the line passes through the 399 foot long Hitchcock Tunnel, opened in 1865.
- The halfway point of the 17-Mile Grade is at Strecker, once a watering station for steam engines. Altamont, at 2,628 feet above sea level, is the highest point on the B&O system. At Terra Alta, elevation 2,557 feet, the 17-Mile Grade gives way to the 12-mile long Cranberry grade from Rowlesburg.

Surveys

- Earlier survey for the Patowmack Canal, 1825.
- Railroad surveys, 1848-49.
- Built by multiple contractors and company forces, in 1 mile sections.
- Estimated cost, $7 million.
- 58 pounds per yard rail.

Grade Profile

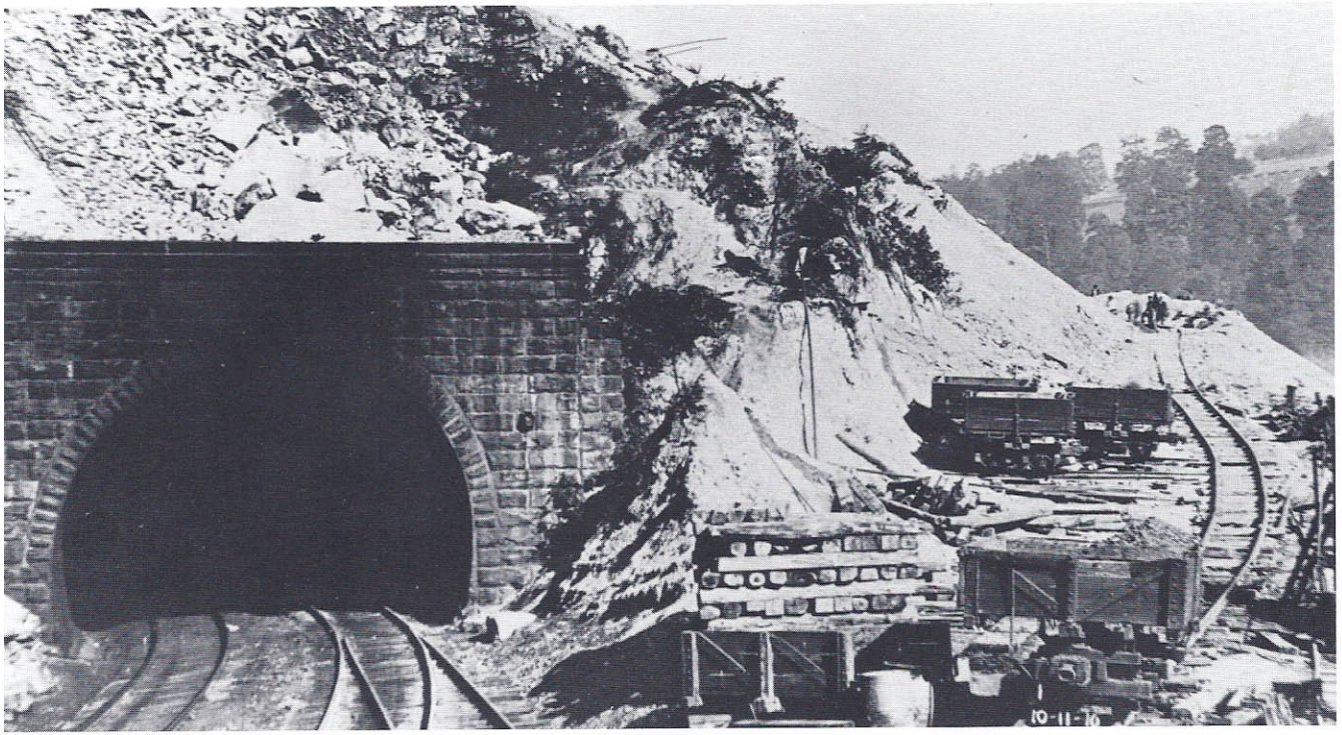


Steep

- 116 feet of elevation to the mile, 2.2%
- Operational experience on Eckhart Railroad, at 135 feet to the mile, 2.6%
- Based on the experience, Congress wrote into the charters for the Transcontinental Railroad that grades could not exceed 2.3%

Construction of the 17-mile grade

- Construction at numerous points along the line similtaneously, not just at one end.
- So, how did they get the men, tools, and supplies where they were needed, without a railroad?
- Shoo-fly track. temporary and movable.
- One Winans Camel plus one car.10% grade. No problem.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tunnels

- Tunnels were used to reduce the grade.
- Dug by hand, with black powder blasting.
- Worked from both ends, and some times from the middle as well.
- Later, some of these would be “daylighted”

(have their roofs removed) when power machinery was used.

What it took

- 1,000 horses.
- 5,000 laborers, mostly Irish immigrants.
  - Paid 87 ½ cents per day.
  - Weather was a challenge.
  - Fall of 1851, cholera.
- New technology – the Winans “Baltimore Engine”

B&O 111

- One of 140 Winans Camels on the B&O (70% of his sales).
- *Camel* was the first engine of this type delivered. gave its name to the class.
- 111 was delivered 10/18/1852.
- typical price, $9,750. includes patent fees.
- 8 wheels, all driven.

B&O Winans Camel 111 with work train

Camel details

- 3 models, based on firebox length.
- 43 inch wheels.
- riveted 5/16” iron plate for the boilers.
- 100 psi operating steam pressure.
- usually painted green.
- 27 tons.
- tender held 5 tons of coal, and more than 2,000 gallons of water. 23 tons, fully loaded.
- average service life on B&O between rebuilds, 8.5 years.
- 17,500 miles per year per engine.

Camel performance

- speed limited to 10-15 mph, due to boiler capacity and lack of a pilot truck.
- could haul 110 loaded coal hoppers on the level.
- On the 17-mile grade, the performance was 144 trailing tons (about 48 hoppers).
- limiting factor was the brakes, and the dexterity of the brakemen.

On the road

- July 22, 1851, a Camel locomotive left Cumberland for Piedmont with 5 coaches.
- Latrobe and President Swann onboard.
- At Piedmont, 1 coach was removed, 5 gondola cars loaded with iron added.
- 115 trailing tons.
- 4 miles of track had been laid, to Everett tunnel.
- Train went up the grade at 18mph
- (as shown in the practice run the day before)

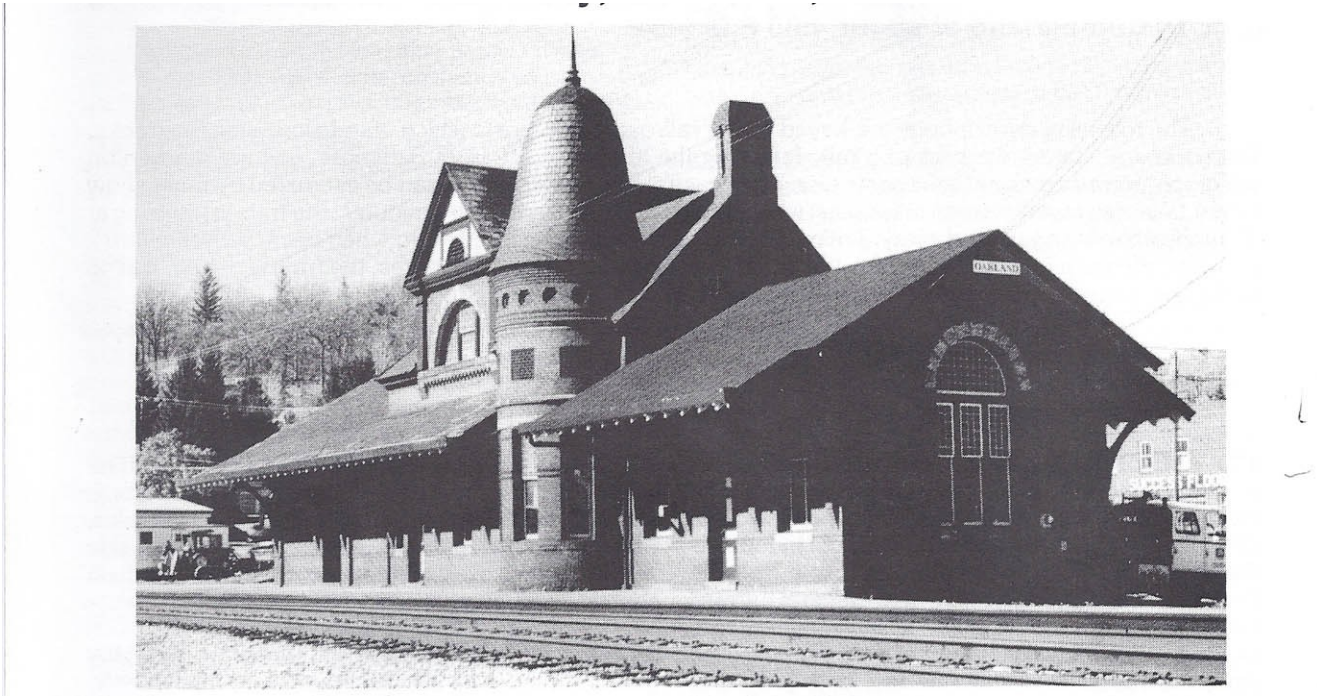
Oakland

- Situated just a few miles from the source of the Potomac, at the Fairfax Stone on Backbone Mountain.
- Elevation 2,398 feet above sea level.
- Train Station dates from 1884. E. F. Baldwin design. Meant to increase tourism.
- Oakland, Rowlesburg, Grafton did not exist before the railroad was built.

Original station

Warren Somerville

The original Oakland Station was later replaced with one designed by E. F. Baldwin



And, in conclusion…

- The B&O Railroad faced the challenges of getting over the Applachians in the 1850's to complete their charter goals.
- Tidewater to the Ohio River.
- Political issues; funding issues; engineering issues.
- The 17-Mile grade was the largest challenge to American railroads until the Transcontinental line was built 20 years later.

B&O west

- The B&O also built west to the Ohio at Pittsburgh, facing similar challenges.
- The path was also defined in the earlier 1825 surveys for the Patowmack Canal.
- Sandpatch Grade – but that’s another story.